Number and Quantity: The Real Number System (N-RN)

Extend the properties of exponents to rational exponents.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.N-RN.A.1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.* Connections: *11-12.RST.4; 11-12.RST.9; 11-12.WHST.2d*	A II	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others.			
HS.N-RN.A.2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.	A II	*HS.MP.7.* Look for and make use of structure.			

Number and Quantity: The Real Number System (N-RN) **Use properties of rational and irrational numbers.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.N-RN.B.3. Explain why the sum or product of two rational numbers are rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. Connection: *9-10.WHST.1e*	A I	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others.			

Number and Quantity: Quantities ★ (N-Q)

Reason qualitatively and use units to solve problems.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.N-Q.A.1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. Connections: *SCHS-S1C4-02*; *SSHS-S5C5-01*	A I ★	*HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision.	1.4 1.8 1.55 1.56 2.22 2.4 2.49 3.42 3.56 3.64 4.12	To convert from English to metric units of measure To convert between ohms and mega ohms To convert frequency units to rpm units To use units between ohms and mega ohms To convert between different battery capacity ratings To convert mega kilos to kilos using dimensional analysis To convert between Celsius and Fahrenheit To convert from inches to degrees in toe To use conversions and percentage formulas to compute tire diameter from	When traveling on vacation, Joe averaged 55 miles per hour. How many miles did Joe travel in 2 weeks if he averaged driving 8 hours per day? **Solution:** $\frac{55\,\text{miles}}{\text{hour}} \bullet \frac{8\,\text{hr}}{1\,\text{day}} \bullet \frac{7\,\text{day}}{1\,\text{week}} \bullet \frac{2\,\text{weeks}}{1} = 6160\,\text{miles}$

Number and Quantity: Quantities ★ (N-Q) **Reason qualitatively and use units to solve problems.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
			4.14 4.23	tire sizes being given in a combination of metric and standard measurements and profile percentage To covert inch pounds to foot pounds and metric to standard for torque To convert between milliseconds and hertz To convert between Celsius to Fahrenheit To use conversions for temperatures, speed, pressures and other data from vehicle's computers and between standard and metric	
HS.N-Q.A.2. Define	A I	*HS.MP.4.* Model	4.63	To use different	An auto technician worked on a car for a period of 2 weeks. Each week he spent a

Number and Quantity: Quantities ★ (N-Q)

Reason qualitatively and use units to solve problems.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
appropriate quantities for the purpose of descriptive modeling. Connection: *SSHS-S5C5-01*	A II ★	with mathematics. *HS.MP.6.* Attend to precision.		quantities when servicing vehicles and to use appropriate quantities for different systems on vehicles	total of 30 hours on the car. The final bill for labor came to $1800. How much was the labor rate per hour? **Solution:** $30.00 per hour
HS.N-Q.A.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	A I	*HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision.	2.8 2.9 2.10 3.46 3.47 3.48 3.49 3.50 3.51 3.52 4.23 4.7 4.8 4.9 4.10 4.11 4.29 4.30 4.31 4.32 4.33 4.34 4.41 4.42 4.44	To determine if reading is within the measure of margin of error from specifications To choose level of accuracy to make adjustments according to tolerances when performing wheel alignments because specifications are given in fractions of inches and degrees of tolerances. To choose level of accuracy to make adjustments according to tolerances To determine if a	A measurement should be 0.1" ± 0.05. Would a measurement of 0.15" be within tolerance? **Solution:** Yes

Number and Quantity: Quantities ★ (N-Q) **Reason qualitatively and use units to solve problems.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
				reading is within the measure of margin of error from specifications	

Number and Quantity: The Complex Number System (N-CN)

Perform arithmetic operations with complex numbers.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.N-CN.A.1. Know there is a complex number *i* such that $i^2 = -1$, and every complex number has the form $a + bi$ with *a* and *b* real.	A II	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.6.* Attend to precision.			
HS.N-CN.A.2. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. Connection: *11-12.RST.4*	A II	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.7.* Look for and make use of structure.			
HS.N-CN.A.3. Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers. Connection: *11-12.RST.3*	+	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.7.* Look for and make use of structure.			

Number and Quantity: The Complex Number System (N-CN) **Represent complex numbers and their operations on the complex plane.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.N-CN.B.4. Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number. Connection: *11-12.RST.3*	+	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.7.* Look for and make use of structure.			
HS.N-CN.B.5. Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. *For example,* $(-1 + \sqrt{3}\, i)^3 = 8$ *because*	+	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.7.* Look for and make use of structure.			

Number and Quantity: The Complex Number System (N-CN) **Represent complex numbers and their operations on the complex plane.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
(-1 + √3 i) has modulus 2 and argument 120°.					
HS.N-CN.B.6. Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints. Connection: *11-12.RST.3*	+	*HS.MP.2.* Reason abstractly and quantitatively.			

Number and Quantity: The Complex Number System (N-CN)

Use complex numbers in polynomial identities and equations.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.N-CN.C.7. Solve quadratic equations with real coefficients that have complex solutions.	A II				
HS.N-CN.C.8. Extend polynomial identities to the complex numbers. *For example, rewrite $x^2 + 4$ as $(x + 2i)(x – 2i)$.*	+	*HS.MP.7.* Look for and make use of structure.			
HS.N-CN.C.9. Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials. Connection: *11-12.WHST.1c*	+	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.7.* Look for and make use of structure.			

Number and Quantity: Vector and Matrix Quantities (N-VM) **Represent and model with vector quantities.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.N-VM.A.1. Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., *v*, |*v*|, ||*v*||, $\vec{v}$).	+	*HS.MP.4.* Model with mathematics.			
HS.N-VM.A.2. Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.	+	*HS.MP.2.* Reason abstractly and quantitatively.			
HS.N-VM.A.3. Solve problems involving velocity and other quantities that can be represented by vectors. Connections: *11-12.RST.9; SCHS-S5C2-01*; *SCHS-S5C2-02*;	+	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with			

Number and Quantity: Vector and Matrix Quantities (N-VM) **Represent and model with vector quantities.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
SCHS-S5C2-06; *11-12.WHST.2d*		mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision.			

Number and Quantity: Vector and Matrix Quantities (N-VM) **Perform operations on vectors.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.N-VM.B.4. Add and subtract vectors.	+	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.			
a. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.	+				
b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.	+				
HS.N-VM.B.5. Multiply a vector by a scalar.	+	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use			
a. Represent scalar multiplication graphically by scaling vectors and possibly	+				

Number and Quantity: Vector and Matrix Quantities (N-VM) **Perform operations on vectors.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
reversing their direction; perform scalar multiplication component-wise, e.g., as $c(v_x, v_y) = (cv_x, cv_y)$.		appropriate tools strategically.			
b. Compute the magnitude of a scalar multiple cv using $\|\|cv\|\| = \|c\|v$. Compute the direction of $c\boldsymbol{v}$ knowing that when $\|c\|v \neq 0$, the direction of cv is either along v (for $c > 0$) or against v (for $c < 0$). Connection: *ETHS-S6C1-03*	+				

Number and Quantity: Vector and Matrix Quantities (N-VM)

Perform operations on matrices and use matrices in applications.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.N-VM.C.6. Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network. Connections: *9-10.RST.7*; *9-10.WHST.2f*; *11-12.RST.9*; *11-12.WHST.2e*; *ETHS-S6C2-03*	+	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.	1.1* 2.1 3.1 4.1 5.1 6.1 7.1 8.1	To utilize service information and represent in a matrix format	A service bulletin is released stating that there is a problem with the oil system of Ford cars. Expectations are that oil changes will rise 50%. Write an inventory matrix for the following situation: An auto shop manager is ordering supplies for the auto shop before the bulletin. For January he orders 4 cases of oil for shop 1 and 6 cases for shop 2. He also orders 18 oil filters for shop 1 and 20 for shop 2. At the end of January he receives the bulletin and adjusts his February order. What affect does this have on his order? **Solution:** January: Oil, Filters; 1 [4 6]; 2 [18 20] February: Oil, Filters; 1 [6 9]; 2 [27 30]
HS.N-VM.C.7. Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled. Connections: *9-10.RST.3*; *ETHS-S6C2-03*	+	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.	1.1* 2.1 3.1 4.1 5.1 6.1 7.1 8.1	To evaluate vehicle and service information	The following is a recall matrix for Car Company A's model line based on service information. The number of cars recalled during the second quarter was increased by 10%. What affect does this have on the number of recalls? C1 C2 C3 A1 [50 20 10] A2 [70 30 40] A3 [90 80 30] A1 = model A C1 = color 1 A2 = model B C2 = color 2 A3 = model C C3 = color 3 **Solution:**

Number and Quantity: Vector and Matrix Quantities (N-VM)

Perform operations on matrices and use matrices in applications.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
					$\begin{array}{c} \\ A1 \\ A2 \\ A3 \end{array}\begin{array}{c} \begin{array}{ccc} C1 & C2 & C3 \end{array} \\ \begin{bmatrix} 55 & 22 & 11 \\ 77 & 33 & 44 \\ 99 & 88 & 33 \end{bmatrix} \end{array}$
HS.N-VM.C.8. Add, subtract, and multiply matrices of appropriate dimensions. Connections: *9-10.RST.3*; *ETHS-S6C2-03*	+	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.	2.1 3.1 4.1 5.1 6.1 7.1 8.1	To compute the number of services performed at multiple locations	An auto repair has 2 locations. At the first location they did 25 oil changes and 12 tire rotations. At the second location they did 37 oil changes and 10 tire rotations. Find the total number of these services provided. **Solution:** $\begin{bmatrix} 25 \\ 12 \end{bmatrix} + \begin{bmatrix} 37 \\ 10 \end{bmatrix} = \begin{bmatrix} 62 \\ 22 \end{bmatrix}$
HS.N-VM.C.9. Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties. Connections: *ETHS-*	+	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.6.* Attend to precision.			

Number and Quantity: Vector and Matrix Quantities (N-VM) **Perform operations on matrices and use matrices in applications.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
S6C2-03; *9-10.WHST.1e*					
HS.N-VM.C.10. Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.	+	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.6.* Attend to precision.			
HS.N-VM.C.11. Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors. Connections: *ETHS-S6C1-03*; *11-12.WHST.1a*	+	*HS.MP.4*. Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.			

Number and Quantity: Vector and Matrix Quantities (N-VM) **Perform operations on matrices and use matrices in applications.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.N-VM.C.12. Work with 2 × 2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area. Connection: *ETHS-S6C1-03*	+	*HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.			

Algebra: Seeing Structure in Expressions (A-SSE) **Interpret the structure of expressions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.A-SSE.A.1. Interpret expressions that represent a quantity in terms of its context.	A I ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.7.* Look for and make use of structure.	2.4	To use principles of electricity for Ohm's Law with proper math terminology such as term and expression	In Ohm's Law, E = IR, what are I and R called? **Solution:** Factors
a. Interpret parts of an expression, such as terms, factors, and coefficients. Connection: *9-10.RST.4*	A I ★				
b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret* $P(1+r)^n$ *as the product of P and a factor not depending on P.*	A I ★				
HS.A-SSE.A.2. Use the structure of an expression to identify ways to rewrite it. *For example,*		*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.7.* Look for and make use of			

Algebra: Seeing Structure in Expressions (A-SSE) **Interpret the structure of expressions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.		structure.			

Algebra: Seeing Structure in Expressions (A-SSE) **Write expressions in equivalent forms to solve problems.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.A-SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Connections: *9-10.WHST.1c*; *11-12.WHST.1c*	A I A II ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively.			
a. Factor a quadratic expression to reveal the zeros of the function it defines.	A I ★	*HS.MP.4.* Model with mathematics.			

Algebra: Seeing Structure in Expressions (A-SSE)

Write expressions in equivalent forms to solve problems.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	A I ★	*HS.MP.7.* Look for and make use of structure.			
c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*	A I A II ★				
HS.A-SSE.B.4. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and	A II ★	*HS.MP.3.* Construct viable arguments and critique the reasoning of others.			

Algebra: Seeing Structure in Expressions (A-SSE) **Write expressions in equivalent forms to solve problems.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
use the formula to solve problems. *For example, calculate mortgage payments.* Connection: *11-12.RST.4*		*HS.MP.4.* Model with mathematics. *HS.MP.7.* Look for and make use of structure.			

Algebra: Arithmetic with Polynomials and Rational Expressions (A-APR) **Perform arithmetic operations on polynomials.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.A-APR.A.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. Connection: *9-10.RST.4*	A I				

Algebra: Arithmetic with Polynomials and Rational Expressions (A-APR) **Understand the relationship between zeros and factors of polynomials.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.A-APR.B.2. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on	A II	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the			

Algebra: Arithmetic with Polynomials and Rational Expressions (A-APR) **Understand the relationship between zeros and factors of polynomials.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.		reasoning of others.			
HS.A-APR.B.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	A I A II	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.			

Algebra: Arithmetic with Polynomials and Rational Expressions (A-APR)

Use polynomial identities to solve problems.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.A-APR.C.4. Prove polynomial identities and use them to describe numerical relationships. *For example, the polynomial identity* $(x^2+y^2)^2 = (x^2– y^2)^2 + (2xy)^2$ *can be used to generate Pythagorean triples.*	A II	*HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			
HS.A-APR.C.5. Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of *x* and *y* for a positive integer *n*, where *x* and *y* are any numbers, with coefficients determined for example by Pascal's Triangle. (The Binomial Theorem can be proved by mathematical induction or by a combinatorial argument.)	+	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure.			

Algebra: Arithmetic with Polynomials and Rational Expressions (A-APR) **Rewrite rational expressions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.A-APR.D.6. Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.	A II	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.7.* Look for and make use of structure.			
HS.A-APR.D.7. Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add,	+	*HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			

Algebra: Arithmetic with Polynomials and Rational Expressions (A-APR) **Rewrite rational expressions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
subtract, multiply, and divide rational expressions.					

Algebra: Creating Equations ★ (A-CED)

Create equations that describe numbers or relationships.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.A-CED.A.1. Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*	A I A II ★	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.	1.4 1.8 1.56 2.4	To solve for one of the variables using Pascal's Law (F = P ● A) To use equations to determine tire size versus circumference To use Ohm's Law to solve for missing values	If one is pushing down on a piston with 100 pounds of Force and the area is 2 square inches, how much force is being applied? Use Pascal's Law F = P ● A where F is force, P is Pressure and A is Area. **Solution:** 200 PSI
HS.A-CED.A.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	A I ★	*HS.MP.2*. Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.	2.4	To use a table of values from Ohm's Law to create the formula	Use the following data table to write an equation that represents the relationship between amps and volts. Amps (x): .3, .45, .6, .9 Volts (y): 3, 4.5, 6, 9 **Solution:** y = 10x
HS.A-CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-	A I ★	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools	1.12*	To fill cooling systems with recommended anti-freeze and water	The cooling system of a car has a maximum capacity of 16 quarts. It is filled with water and anti-freeze to form the coolant. The number of quarts of water must be greater than or equal to the amount of anti-freeze. Write a system of constraints to represent this scenario. **Solution:**

Algebra: Creating Equations ★ (A-CED)

Create equations that describe numbers or relationships.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*		strategically.			$x \geq 0$ $y \geq 0$ $x + y \leq 16$ $x \geq y$
HS.A-CED.A.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.*	A I ★	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5*. Use appropriate tools strategically. *HS.MP.7.* Look for and make use of structure.	1.4 2.4	To use Pascal's Law to solve for any variable in F = P ● A To use Ohm's Law to solve for any variable in E = I ● R	**Question 1** Given Pascal's Law, F = PA, solve for A. **Solution:** A = $\frac{F}{P}$ **Question 2** Given Ohm's Law, E = IR, solve for R. **Solution:** R = $\frac{E}{I}$

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.A-REI.A.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	A I A II	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.7.* Look for and make use of structure.			
HS.A-REI.A.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	A II	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. HS.*MP.7.* Look for and make use of structure.			

Algebra: Reasoning with Equations and Inequalities ★ (A-REI)

Solve equations and inequalities in one variable.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.A-REI.B.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	A I	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			
HS.A-REI.B.4. Solve quadratic equations in one variable.	A I A II	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			
a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.	A I		1.4	To solve for radius using Pascal's Law if the area is a circle	Knowing that a specific master cylinder will produce 5 psi (P) and an output of 45 pounds of force (F) is needed, how is Pascal's law used ($A = \frac{F}{P}$) to determine the radius of a piston needed to apply that amount of force? Remember the area of a circle is $A = \pi r^2$. **Solution:** $\frac{3}{\sqrt{\pi}}$
b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking	A I A II				

Algebra: Reasoning with Equations and Inequalities ★ (A-REI) **Solve equations and inequalities in one variable.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.					

Algebra: Reasoning with Equations and Inequalities ★ (A-REI) **Solve systems of equations.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.A-REI.C.5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a	*A I*	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others.			

Algebra: Reasoning with Equations and Inequalities ★ (A-REI)
Solve systems of equations.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
system with the same solutions.					
HS.A-REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. Connection: *ETHS-S6C2-03*	A I A II	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.	1.1* 2.1 3.1 4.1 5.1 6.1 7.1 8.1	To compute number of recalled automobiles	Ford has twice as many recalls for brake repairs as GM. The cost for each Ford repair was $200 and the cost for each GM repair was $150. The combined cost for all repairs was $500,000. How many of the brake repairs did each company make? **Solution:** $200x+150y=500,000$ $2x=y$ $200x+150(2x)=500,000$ $500x=500,000$ $x=1000\,cars$ $y=2000\,cars$
HS.A-REI.C.7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For*	A II	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use			

Algebra: Reasoning with Equations and Inequalities ★ (A-REI) **Solve systems of equations.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
example, find the points of intersection between the line *$y = -3x$ and the circle $x^2 + y^2 = 3$.*		appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			
HS.A-REI.C.8. Represent a system of linear equations as a single matrix equation in a vector variable.	+				
HS.A-REI.C.9. Find the inverse of a matrix if it exists, and use it to solve systems of linear equations (using technology for matrices of dimension 3×3 or greater). Connection: *ETHS-*	+	*HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure.			

Algebra: Reasoning with Equations and Inequalities ★ (A-REI)

Solve systems of equations.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
S6C2-03					

Algebra: Reasoning with Equations and Inequalities ★ (A-REI)

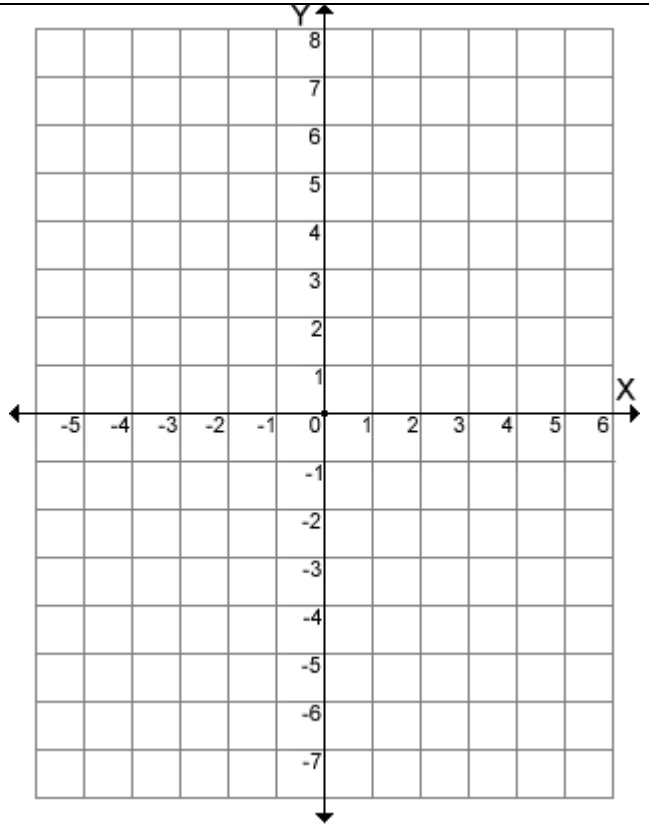
Represent and solve equations and inequalities graphically.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.A-REI.D.10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).	A I	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics.	2.4	To describe current with a variable voltage applied to a resistance	Using the following table of data, graph the points and find its equation.

Amps	.3	.45	.6	.9
Volts	3	4.5	6	9

Algebra: Reasoning with Equations and Inequalities ★ (A-REI)

Solve systems of equations.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
					 **Solution:** y = 10x
HS.A-REI.D.11. Explain why the *x*-	A I A II	*HS.MP.2.* Reason abstractly and			

Algebra: Reasoning with Equations and Inequalities ★ (A-REI) **Solve systems of equations.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. Connection: *ETHS-S6C2-03*	★	quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision.			
HS.A-REI.D.12. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the	A I	*HS.MP.4.* Model with mathematics. HS.MP.5. Use appropriate tools			

Algebra: Reasoning with Equations and Inequalities ★ (A-REI) **Solve systems of equations.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.		strategically.			

Functions: Interpreting Functions (F-IF) **Understand the concept of a function and use of function notation.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-IF.A.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f*(*x*) denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y* = *f*(*x*).	A I	*HS.MP.2.* Reason abstractly and quantitatively.			
HS.F-IF.A.2. Use function notations, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. Connection: *9-10.RST.4*	A I	*HS.MP.2.* Reason abstractly and quantitatively.			

Functions: Interpreting Functions (F-IF)

Understand the concept of a function and use of function notation.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-IF.A.3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.*	A I A II	*HS.MP.8.* Look for and express regularity in repeated reasoning.			

Functions: Interpreting Functions (F-IF)

Interpret functions that arise in applications in terms of context.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs	A I A II ★	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools	6.2* 6.4	To represent the maximum and minimum number of amps for a car	An electrical system on a car with constant resistance has amps as a function of volts or A(V). The maximum number of volts in this circuit is 10 amps. Find the domain of the number of amps allowable in this circuit. **Solution:** [0, 10]

Functions: Interpreting Functions (F-IF)

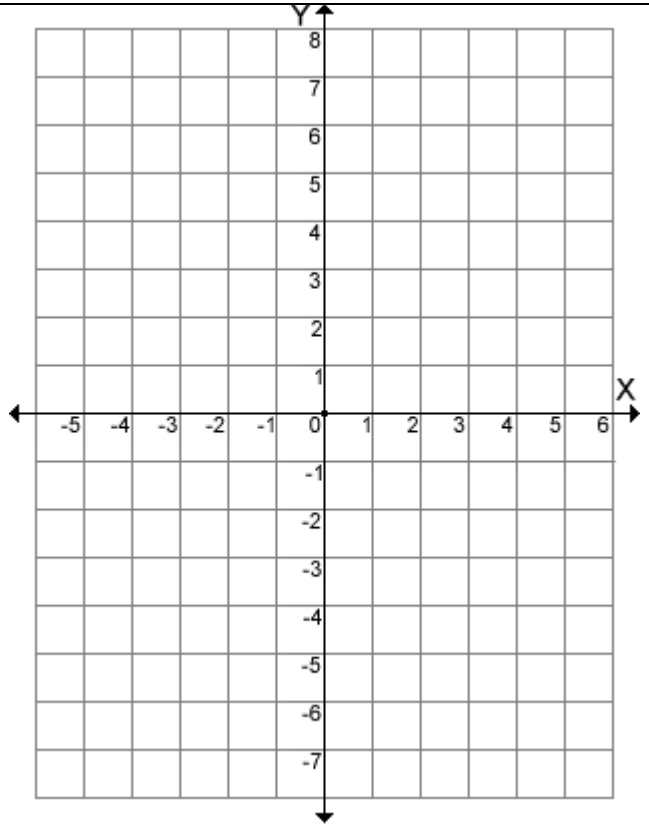
Interpret functions that arise in applications in terms of context.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* Connections: *ETHS-S6C2.03*; *9-10.RST.7*; *11-12.RST.7*		strategically. *HS.MP.6.* Attend to precision.			
HS.F-IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n*	A I ★	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.6.* Attend to precision.	5.3*	To test the pedal height of brake pedals for specifications to determine necessary action.	The brake pedal is a function of the return spring h(s). The brake pedal needs to be tested to make sure it is within specifications. What would be the domain of the height? **Solution:** $\left[5, 5\frac{1}{2}\right]$

Functions: Interpreting Functions (F-IF) **Interpret functions that arise in applications in terms of context.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
engines in a factory, then the positive integers would be an appropriate domain for the function. Connection: *9-10.WHST.2f*					

Functions: Interpreting Functions (F-IF)

Interpret functions that arise in applications in terms of context.

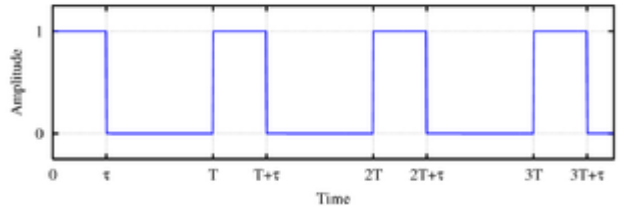
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-IF.B.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. Connections: *ETHS-S1C2-01*; *9-10.RST.3*	A I A II ★	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4*. Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.	1.4 1.56 2.4	To demonstrate hydraulic theory using Pascal's Law F = P ● A To compare tire size (circumference versus diameter) and final drive ratios rev per min to mph To identify rate of change of Ohm's Law To determine resistance versus temperature of water	 Use the above graph and the associated table to calculate the average rate of change (slope) and interpret its meaning over the interval [0.03, 0.12] **Solution:**

Amps	1	2	3	4
Volts	2	4	6	8

Functions: Interpreting Functions (F-IF) **Interpret functions that arise in applications in terms of context.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
					2 ohms increase for every 1 volt increase

Functions: Interpreting Functions (F-IF)

Analyze functions using different representation.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.	A I A II + ★	*HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision.	4.12 4.22	To use step functions to represent duty cycles or pulse width modulation using an oscilloscope	 In the above graph of a fuel injector, where T =5 ms and t = 1 ms, what is the duty cycle of injector "on time"? **Solution:** 80%
a. Graph linear and quadratic functions and show intercepts, maxima, and minima. Connections: *ETHS-S6C1-03*; *ETHS-S6C2-03*	A I ★				
b. Graph square root, cube root, and piecewise-defined functions, including step functions and	A I ★				

Functions: Interpreting Functions (F-IF)
Analyze functions using different representation.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
absolute value functions. Connections: *ETHS-S6C1-03*; *ETHS-S6C2-03*					
c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Connections: *ETHS-S6C1-03*; *ETHS-S6C2-03* *Continued on next page*	A II ★				
d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Connections: *ETHS-S6C1-03*;	+ ★				

Functions: Interpreting Functions (F-IF) **Analyze functions using different representation.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
ETHS-S6C2-03					
e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. Connections: *ETHS-S6C1-03*; *ETHS-S6C2-03*	A II ★				
HS.F-IF.C.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Connection: *11-12.RST.7*	A I A II	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.7.* Look for and make use of structure.			
a. Use the process of factoring and completing the	A I				

Functions: Interpreting Functions (F-IF) **Analyze functions using different representation.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. Connection: *11-12.RST.7*					
b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*	A II				

Functions: Interpreting Functions (F-IF)

Analyze functions using different representation.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
Connection: *11-12.RST.7*					
HS.F-IF.C.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.* Connections: *ETHS-S6C1-03*; *ETHS-S6C2-03*; *9-10.RST.7*	A I A II	*HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure.	2.4	To compare two data sets using Ohms' Law	Use Ohm's Law to calculate the resistance for each circuit. Write a statement that best represents the resistance of the two circuits. Circuit 1 Amps .3 .45 .6 .9 Volts 3 4.5 6 9 Circuit 2 Amps .6 .9 1.2 1.8 Volts 3 4.5 6 9 **Solution:** Circuit 2 has the greater resistance.

Functions: Building Functions (F-BF)

Build a function that models a relationship between two quantities.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-BF.A.1. Write a function that describes a relationship between two quantities. Connections: *ETHS-S6C1-03*; *ETHS-S6C2-03*	A I A II + ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			
a. Determine an explicit expression, a recursive process, or steps for calculation from a context. Connections: *ETHS-S6C1-03*; *ETHS-S6C2-03*; *9-10.RST.7*; *11-12.RST.7*	A I A II ★				
b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a*	A II ★				

Functions: Building Functions (F-BF)

Build a function that models a relationship between two quantities.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
cooling body by adding a constant function to a decaying exponential, and relate these functions to the model. Connections: *ETHS-S6C1-03*; *ETHS-S6C2-03* *Continued on next page*					
c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a*	+ ★				

Functions: Building Functions (F-BF) **Build a function that models a relationship between two quantities.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
function of time. Connections: *ETHS-S6C1-03*; *ETHS-S6C2-03*					
HS.F-BF.A.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	A II ★	*HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.8.* Look for and express regularity in repeated reasoning.			

Functions: Building Functions (F-BF) **Build new functions from existing functions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-BF.B.3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.* Connections: *ETHS-S6C2-03*; *11-12.WHST.2e*	A I A II	*HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.7.* Look for and make use of structure.			
HS.F-BF.B.4 Find inverse functions. Connection: *ETHS-S6C2-03*	A II +	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with			
a. Solve an equation of the	A II				

Functions: Building Functions (F-BF) **Build new functions from existing functions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. *For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.*		mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.7.* Look for and make use of structure.			
b. Verify by composition that one function is the inverse of another.	+				
c. Read values of an inverse function from a graph or a table, given that the function has an inverse.	+				
d. Produce an invertible function from a non-invertible function by restricting the domain.	+				
HS.F-BF.B.5. Understand the inverse relationship	+	*HS.MP.2.* Reason abstractly and			

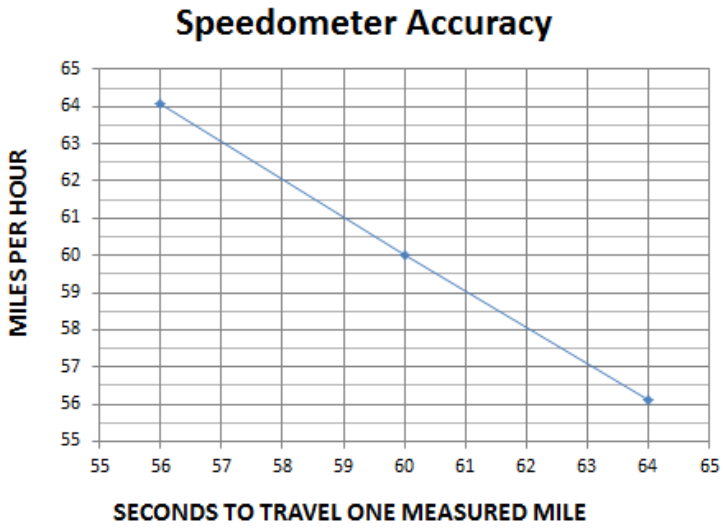
Functions: Building Functions (F-BF) **Build new functions from existing functions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. Connection: *ETHS-S6C2-03*		quantitatively. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure.			

Functions: Linear, Quadratic, and Exponential Models ★ (F-LE) **Construct and compare linear, quadratic, and exponential models and solve problems.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-LE.A.1. Distinguish between situations that can be modeled with linear functions and with exponential functions. Connections: *ETHS-S6C2-03*; *SSHS-S5C5-03*	A I ★	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			
a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. Connection: *11-12.WHST.1a-1e*	A I ★				
b. Recognize situations in which one quantity	A I ★				

Functions: Linear, Quadratic, and Exponential Models ★ (F-LE) **Construct and compare linear, quadratic, and exponential models and solve problems.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
changes at a constant rate per unit interval relative to another. Connection: *11-12.RST.4*					
c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. Connections: *ETHS-S6C1-03*; *ETHS-S6C2-03*; *11-12.RST.4*	A I ★				

Functions: Linear, Quadratic, and Exponential Models ★ (F-LE)

Construct and compare linear, quadratic, and exponential models and solve problems.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-LE.A.2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). Connections: *ETHS-S6C1-03*; *ETHS-S6C2-03*; *11-12.RST.4*; *SSHS-S5C5-03*	A I A II ★	*HS.MP.4.* Model with mathematics. *HS.MP.8.* Look for and express regularity in repeated reasoning.	4.12	To identify a speedometer accuracy level	 Write a function that best represents the speedometer accuracy. **Solution:** f(x) = -x + 65
HS.F-LE.A.3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing	A I ★	*HS.MP.2.* Reason abstractly and quantitatively.			

Functions: Linear, Quadratic, and Exponential Models ★ (F-LE) **Construct and compare linear, quadratic, and exponential models and solve problems.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
linearly, quadratically, or (more generally) as a polynomial function.					
HS.F-LE.A.4. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where *a*, *c*, and *d* are numbers and the base *b* is 2, 10, or *e*; evaluate the logarithm using technology. Connections: *ETHS-S6C1-03*; *ETHS-S6C2-03*; *11-12.RST.3*	A II ★	*HS.MP.7.* Look for and make use of structure.			

Functions: Linear, Quadratic, and Exponential Models ★ (F-LE)

Interpret expressions for functions in terms of the situation they model.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-LE.B.5. Interpret the parameters in a linear or exponential function in terms of a context. Connections: *ETHS-S6C1-03*; *ETHS-S6C2-03*;*SSHS-S5C5-03*; *11-12.WHST.2e*	A I A II ★	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics.	8.1*	To calculate the change of a raise in hourly rate.	The cost for an auto tech to do a diagnosis on a car is a flat rate of $100. He then charges $90 an hour for labor. This function would be expressed as f(h) = $90x + $100. If his hourly rate changed to $110 how would the function change? **Solution:** The slope would be steeper representing that the total bill would be more.

Functions: Trigonometric Functions ★ (F-TF)

Extend the domain of trigonometric functions using the unit circle.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-TF.A.1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.	A II				
HS.F-TF.A.2. Explain how the unit circle in the coordinate plane enables the extension of	A II	*HS.MP.2.* Reason abstractly and quantitatively.			

Functions: Trigonometric Functions ★ (F-TF) **Extend the domain of trigonometric functions using the unit circle.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. Connections: *ETHS-S1C2-01*; *11-12.WHST.2b*; *11-12.WHST.2e*					
HS.F-TF.A.3. Use special triangles to determine geometrically the values of sine, cosine, tangent for π/3, π/4 and π/6, and use the unit circle to express the values of sine, cosine, and tangent for π-*x*, π+*x*, and 2π-*x* in terms of their values for *x*, where *x* is any real number. Connection: *11-12.WHST.2b*	+	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure.			

Functions: Trigonometric Functions ★ (F-TF)

Extend the domain of trigonometric functions using the unit circle.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-TF.A.4. Use the units circle to explain symmetry (odd and even) and periodicity of trigonometric functions. Connections: *ETHS-S1C2-01*; *11-12.WHST.2c*	+	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.5.* Use appropriate tools strategically.			

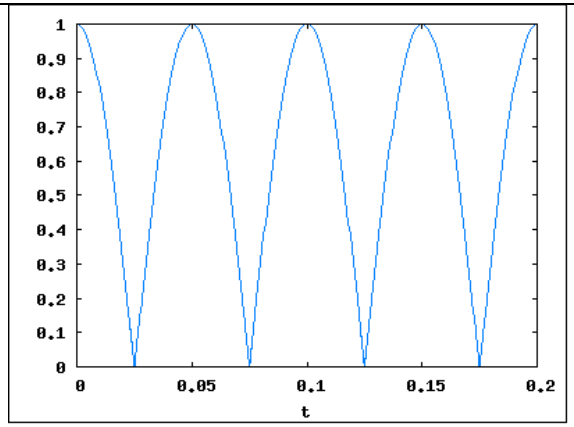
Functions: Trigonometric Functions ★ (F-TF)

Model periodic phenomena with trigonometric functions.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-TF.B.5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. Connection: *ETHS-S1C2-01*	A II ★	*HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.7.* Look for and make use of structure.	3.57 4.5	To model harmonics to diagnose vibration concerns and what is causing the vibration	An oscilloscope oscillates between 0 and 1 volt. It takes 0.2 second to complete 4 cycles. Find the period, amplitude and frequency.

Functions: Trigonometric Functions ★ (F-TF)

Model periodic phenomena with trigonometric functions.

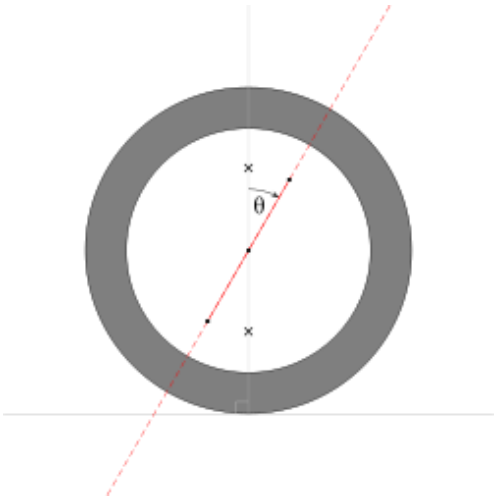
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
					 **Solution:** P = .05 sec, A = .5 volts, F = 20 cycles/sec
HS.F-TF.B.6. Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed. Connections: *ETHS-S1C2-01; 11-12.WHST.2e*	+				

Functions: Trigonometric Functions ★ (F-TF) **Model periodic phenomena with trigonometric functions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-TF.B.7. Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context. Connections: *ETHS-S1C2-01; 11-12.WHST.1a*	+ ★	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.5.* Use appropriate tools strategically.			

Functions: Trigonometric Functions ★ (F-TF) **Prove and apply trigonometric identities.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.F-TF.C.8. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle. Connection: *11-12.WHST.1a-1e*	A II	*HS.MP.3.* Construct viable arguments and critique the reasoning of others.			
HS.F-TF.C.9. Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems. Connection: *11-12.WHST.1a-1e*	+	*HS.MP.3.* Construct viable arguments and critique the reasoning of others.			

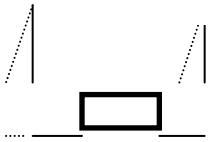
Geometry: Congruence (G-CO)

Experiment with transformations in the plane.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-CO.A.1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. Connection: *9-10.RST.4*	G	*HS.MP.6.* Attend to precision.	3.42	To describe caster, toe, and camber when performing a wheel alignment.	What best describes caster when one is performing a wheel alignment?  **Solution:** The angle θ between the x axis and the segmented line
HS.G-CO.A.2. Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give	G	*HS.MP.5.* Use appropriate tools strategically.			

Geometry: Congruence (G-CO)

Experiment with transformations in the plane.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). Connection: *ETHS-S6C1-03*					
HS.G-CO.A.3. Given a rectangle, parallelogram, trapezoid, or regular polygons, describe the rotations and reflections that carry it onto itself. Connections: *ETHS-S6C1-03*; *9-10.WHST.2c*	G	*HS.MP.3* Construct viable arguments and critique the reasoning of others. *HS.MP.5.* Use appropriate tools strategically.			
HS.G-CO.A.4. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	G	*HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure.	3.52 3.54	To check cradle (sub-frame) and determine necessary action using translation of camber	A technician measuring front camber observes a situation noted in the sketch below. How would he adjust the engine cradle to correct the camber readings of -1°? **Cradle** 

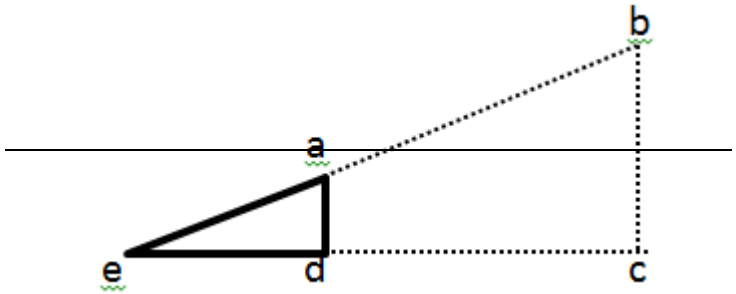
Geometry: Congruence (G-CO) **Experiment with transformations in the plane.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
Connections: *ETHS-S6C1-03*; *9-10.WHST.4*					**Solution:** Move the cradle 1° to the right.
HS.G-CO.A.5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. Connections: *ETHS-S6C1-03*; *9-10.WHST.3*	G	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.7.* Look for and make use of structure.			

Geometry: Congruence (G-CO) **Understand congruence in terms of rigid motions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-CO.B.6. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. Connections: *ETHS-S1C2-01*; *9-10.WHST.1e*	G	*HS.MP.3*. Construct viable arguments and critique the reasoning of others. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.7*. Look for and make use of structure.			
HS.G-CO.B.7. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	G	*HS.MP.3.* Construct viable arguments and critique the reasoning of others.			

Geometry: Congruence (G-CO) **Understand congruence in terms of rigid motions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
Connection: *9-10.WHST.1e*					
HS.G-CO.B.8. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. Connection: *9-10.WHST.1e*	G	*HS.MP.3.* Construct viable arguments and critique the reasoning of others.			

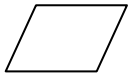
Geometry: Congruence (G-CO) **Prove geometric theorems.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-CO.C.9. Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are*	G	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.5.* Use appropriate tools strategically.			

Geometry: Congruence (G-CO)
Prove geometric theorems.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. Connections: *ETHS-S1C2-01*; *9-10.WHST.1a-1e*					
HS.G-CO.C.10. Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.* Connections: *ETHS-*	G	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.5.* Use appropriate tools strategically.	3.42	To explain principles of steering geometry utilizing theorems about triangles for caster, camber, and toe	Prove the triangles representing tire slippage (or scrub) are similar by calculating side b. Diagram not to scale.  The distance from $\overline{ad}$ is $\frac{1}{32}$" and the distance from $\overline{ed}$ is 1 foot. If $\overline{ec}$ is 1 mile or 5,280 feet, calculate the distance $\overline{bc}$. **Solution:**

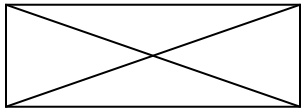
Geometry: Congruence (G-CO)

Prove geometric theorems.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
S1C2-01; *9-10.WHST.1a-1e*					165 feet
HS.G-CO.C.11. Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.* Connection: *9-10.WHST.1a-1e*	G	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.5.* Use appropriate tools strategically.	3.42	To use instrumentation to verify the accuracy of the wheel alignment machine	A wheel alignment machine goes through a self-check to see that the interior angles from the four cameras form a true parallelogram. If two of the angles are 75° what are each of the opposite angles?  **Solution:** They are both 105°.

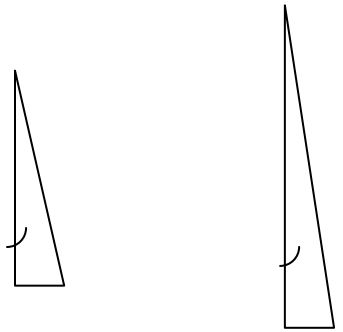
Geometry: Congruence (G-CO)

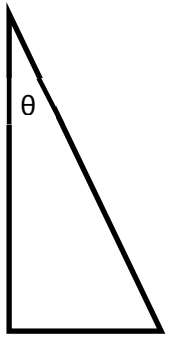
Make geometric constructions.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-CO.D.12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.* Connection: *ETHS-S6C1-03*	G	*HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision.	1.6*	To construct the center of a rectangle to apply a fastening device.	With a straight edge, construct the center of a rectangle. **Solution:** 
HS.G-CO.D.13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	G	*HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision.			

Geometry: Congruence (G-CO) **Make geometric constructions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
Connection: *ETHS-S6C1-03*					

Geometry: Similarity, Right Triangles, and Trigonometry (G-SRT) **Understand similarity in terms of similarity transformations.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-SRT.A.1. Verify experimentally the properties of dilations given by a center and a scale factor: Connections: *ETHS-S1C2-01*; *9-10.WHST.1b*; *9-10.WHST.1e*	G	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.5*. Use appropriate tools strategically.			
a. Dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.	G				
b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	G				
HS.G-SRT.A.2. Given two figures, use the definition of similarity in terms of	G	*HS.MP.3*. Construct viable arguments and critique the	3.42	To use measurements for toe utilizing similar triangles	If Sean changed the size of his tires, would his degree of toe angle remain the same? Prove the following right triangles are similar. The opposite side for the first triangle is 10, and the hypotenuse is 26. The opposite side for the second triangle is 15, and its hypotenuse is 39. Prove they are similar.

Geometry: Similarity, Right Triangles, and Trigonometry (G-SRT) **Understand similarity in terms of similarity transformations.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. Connections: *ETHS-S1C2-01*; *9-10.RST.4*; *9-10.WHST.1c*		reasoning of others. *HS.MP.5*. Use appropriate tools strategically. *HS.MP.7*. Look for and make use of structure.			 **Solution:** Similarity for triangles is the equality of all corresponding pairs of angles and the proportionality of all corresponding sides. The opposite sides have a proportion of 10/15, which reduces to 2/3. The hypotenuses have a proportion of 26/39, which also reduces to 2/3. The proportionality of the corresponding sides is equal. If one uses trigonometry, the angles are both equal at 22.6 degrees.
HS.G-SRT.A.3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. Connections: *ETHS-S1C2-01*; *9-10.RST.7*	G	*HS.MP.3*. Construct viable arguments and critique the reasoning of others.	3.42	To use measurements for toe utilizing similar triangles	**Question 1** Draw 2 right triangles to find the missing side and mark the top angles congruent. The opposite side for the first triangle is 10 and the hypotenuse is 26. The opposite side for the second triangle is 15. What is its hypotenuse? **Solution:** 30

Geometry: Similarity, Right Triangles, and Trigonometry (G-SRT) **Understand similarity in terms of similarity transformations.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
				To use trig ratios to check and adjust caster To use trig ratios to compute change in caster angle to maintain same caster trail	**Question 2** The caster angle θ is 5°, and the radius of the tire is 14 inches. What is the caster trail?  **Solution:** –Tan 5° = 14/x

Geometry: Similarity, Right Triangles, and Trigonometry (G-SRT) **Prove theorems involving similarity.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-SRT.B.4. Prove theorems about triangles. *Theorems include: a line*	G	*HS.MP.3.* Construct viable arguments and critique the			

Geometry: Similarity, Right Triangles, and Trigonometry (G-SRT) **Understand similarity in terms of similarity transformations.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity. Connections: *ETHS-S1C2-01*; *9-10.WHST.1a-1e*		reasoning of others. *HS.MP.5*. Use appropriate tools strategically.			
HS.G-SRT.B.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. Connections: *ETHS-S1C2-01*; *9-10.WHST.1a-1e*	G	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. HS.MP.5. Use appropriate tools strategically.			

Geometry: Similarity, Right Triangles, and Trigonometry (G-SRT)

Define trigonometric ratios and solve problems involving right triangles.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-SRT.C.6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. Connection: *ETHS-S6C1-03*	G				
HS.G-SRT.C.7. Explain and use the relationship between the sine and cosine of complementary angles. Connections: *ETHS-S1C2-01*; *ETHS-S6C1-03*; *9-10.WHST.1c*; *9-10.WHST.1e*	G				
HS.G-SRT.C.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	G ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.4*. Model with	3.48	To use trig ratios to check and adjust caster To use trig ratios to compute change in caster	The caster angle θ is 5^0, and the caster trail is 14 inches. What is the radius of the tire?

Geometry: Similarity, Right Triangles, and Trigonometry (G-SRT) **Define trigonometric ratios and solve problems involving right triangles.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
Connections: *ETHS-S6C2-03*; *9-10.RST.7*		mathematics. *HS.MP.5.* Use appropriate tools strategically.		angle to maintain same caster trail	θ **Solution:** – Cos 5° = x/14

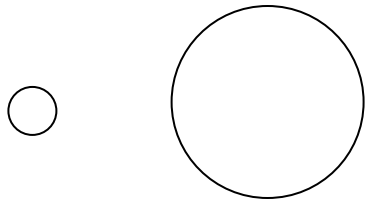
Geometry: Circles (G-SRT) **Apply trigonometry to general triangles.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-SRT.D.9. Derive the formula *A* = ½ *ab* sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. Connection: *ETHS-S6C1-03*	+	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.7.* Look for and make use of structure.			
HS.G-SRT.D.10. Prove the Laws of Sines and Cosines	+	*HS.MP.3.* Construct viable arguments and			

Geometry: Circles (G-SRT) **Apply trigonometry to general triangles.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
and use them to solve problems. Connections: *ETHS-S6C1-03*; *11-12.WHST.1a-1e*		critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			
HS.G-SRT.D.11. Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems,	+	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.4. Model with mathematics.			

Geometry: Circles (G-SRT) **Apply trigonometry to general triangles.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
resultant forces). Connections: *11-12.WHST.2c*; *11-12.WHST.2e*					
HS.G-SRT.D.11. Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces). Connections: *11-12.WHST.2c*; *11-12.WHST.2e*	+	HS.MP.1. Make sense of problems and persevere in solving them. HS.MP.4. Model with mathematics.			

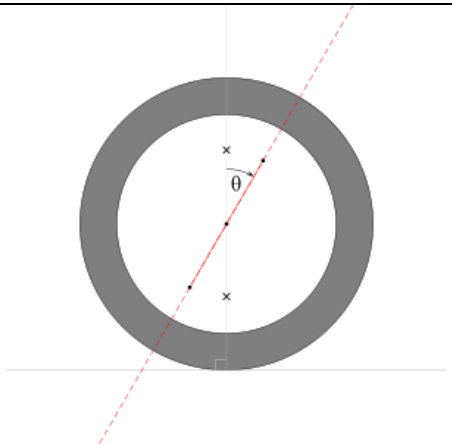
Geometry: Circles (G-C)

Understand and apply theorems about circles.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-C.A.1. Prove that all circles are similar. Connections: *ETHS-S1C2-01*; *9-10.WHST.1a-1e*	G	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.5.* Use appropriate tools strategically.	3.42 3.47 3.49	To use similar circles to check toe out on turns and determine necessary action	Prove the circles are similar if the radius of circle one is 1 inch and the second is 4 inches.  **Solution:** To prove that 2 circles are similar, the ratios of the radii and the diameters must be the same. Circle 1 – r = 1 Circle 2 = r = 4 The ratio of the radii is ¼. Circle 1 - d = 2 Circle 2 – d = 8 The ratio of the diameters is 2/8 which reduces to ¼. Therefore, the circles are similar.

Geometry: Circles (G-C)

Understand and apply theorems about circles.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-C.A.2. Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.* Connections: *9-10.WHST.1c; 11-12.WHST.1c*	G	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.5.* Use appropriate tools strategically.	3.42 3.47	To use relationships in circles to determine caster trails and recalculation due to tire change To use relationships in circles to determine caster trails	 The radius of the tire x is 14"and the caster angle is 5° (θ). What is the caster trail for the side opposite the angle? **Solution:** 1.22"
HS.G-C.A.3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	G	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.5*. Use appropriate tools			

Geometry: Circles (G-C) **Understand and apply theorems about circles.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
		strategically.			
HS.G-C.A.4. Construct a tangent line from a point outside a given circle to the circle. Connection: *ETHS-S6C1-03*	+	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.5.* Use appropriate tools strategically.			

Geometry: Circles (G-C) **Find arc lengths and areas of sectors of circles.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-C.B.5. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector. Connections: *ETHS-S1C2-01*; *11-12.RST.4*	G	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others.			

Geometry: Expressing Geometric Properties with Equations (G-GPE) **Translate between the geometric description and the equation for a conic section.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-GPE.A.1. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. Connections: *ETHS-S1C2-01*; *11-12.RST.4*	G	*HS.MP.7.* Look for and make use of structure. HS.MP.8. Look for and express regularity in repeated reasoning.			
HS.G-GPE.A.2. Derive the equation of a parabola given a focus and directrix. Connections: *ETHS-S1C2-01*; *11-12.RST.4*	A II	*HS.MP.7.* Look for and make use of structure. HS.MP.8. Look for and express regularity in repeated reasoning.			
HS.G-GPE.A.3. Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of	+	*HS.MP.7.* Look for and make use of structure. HS.MP.8. Look for and express regularity in repeated			

Geometry: Expressing Geometric Properties with Equations (G-GPE) **Translate between the geometric description and the equation for a conic section.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
distances from the foci is constant. Connections: *ETHS-S1C2-01*; *11-12.RST.4*		reasoning.			

Geometry: Expressing Geometric Properties with Equations (G-GPE) **Use coordinates to prove simple geometric theorems algebraically.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-GPE.B.4. Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).* Connections: *ETHS-*	G	*HS.MP.3.* Construct viable arguments and critique the reasoning of others.			

Geometry: Expressing Geometric Properties with Equations (G-GPE) **Use coordinates to prove simple geometric theorems algebraically.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
S1C2-01; *9-10.WHST.1a-1e*; *11-12.WHST.1a-1e*					
HS.G-GPE.B.5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). Connection: *9-10.WHST.1a-1e*	G	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.8.* Look for and express regularity in repeated reasoning.			
HS.G-GPE.B.6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio. Connections: *ETHS-S1C2-01*; *9-10.RST.3*	G	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.8*. Look for and express regularity in repeated reasoning.			

Geometry: Expressing Geometric Properties with Equations (G-GPE) **Use coordinates to prove simple geometric theorems algebraically.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-GPE.B.7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. Connections: *ETHS-S1C2-01*; *9-10.RST.3*; *11-12.RST.3*	G ★	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision.			

Geometry: Geometric Measurement and Dimension (G-GMD) **Explain volume formulas and use them to solve problems.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-GMD.A.1. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments.* Connections: *9-10.RST.4; 9-10.WHST.1c; 9-10.WHST.1e; 11-12.RST.4; 11-12.WHST.1c; 11-12.WHST.1e*	G	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.			
HS.G-GMD.A.2. Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures. Connections: *9-10.RST.4*;	+	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. HS.MP.4. Model with mathematics.			

Geometry: Geometric Measurement and Dimension (G-GMD) **Explain volume formulas and use them to solve problems.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
9-10.WHST.1c; *9-10.WHST.1e*; *11-12.RST.4*; *11-12.WHST.1c*; *11-12.WHST.1e*		HS.MP.5. Use appropriate tools strategically.			
HS.G-GMD.A.3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. Connection: *9-10.RST.4*	G ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively.	4.1	To use bore (diameter) and stroke (height) to calculate volumes of cylinders for computing displacements, compressions ratios, etc. To use volumes to calculate manifold pressures and compression pressure To use volume and pressure to calculate volumetric efficiency	The volume (displacement) of a cylinder is 0.71 liters. What is the height (stroke) if the diameter (bore) is 4 inches? **Solution:** .06 inches

Geometry: Geometric Measurement and Dimension (G-GMD) **Visualize relationships between two-dimensional and three dimensional objects.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***

Geometry: Geometric Measurement and Dimension (G-GMD) **Visualize relationships between two-dimensional and three dimensional objects.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-GMD.B.4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. Connection: *ETHS-S1C2-01*	G	*HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.			

Geometry: Geometric Measurement and Dimension ★ (G-MG) **Apply geometric concepts in modeling situations.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.G-MG.A.1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). Connections: *ETHS-S1C2-01*; *9-10.WHST.2c*	G ★	*HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.7.* Look for and make use of structure.	8.4*	To make connections between the shape of an auto part and a geometric shape.	What geometric shape most closely resembles a combustion chamber? **Solution:** Hemisphere
HS.G-MG.A.2. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). Connection: *ETHS-S1C2-01*	G ★	*HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.7.* Look for and make use of structure.	4.1	To use density of atmosphere at different altitudes and temperatures to calculate proper air fuel measurements	Stoichiometric air fuel ratio is 14.7:1. If Pam had an air density of approximately 0.075 pounds per cubic foot at sea level and drove to an altitude of 10,000 feet where the air density was approximately 0.050 pounds per cubic foot, what percentage would she have to lean out her fuel? **Solution:** 33%
HS.G-MG.A.3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or	G ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.4.* Model with mathematics.			

Geometry: Geometric Measurement and Dimension ⋆ (G-MG) **Apply geometric concepts in modeling situations.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
minimize cost; working with typographic grid systems based on ratios). Connection: *ETHS-S1C2-01*		*HS.MP.5.* Use appropriate tools strategically.			

Statistics and Probability: Interpreting Categorical and Quantitative Data★ (S-ID) **Summarize, represent, and interpret data on a single count or measurement variable.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.S-ID.A.1. Represent data with plots on the real number line (dot plots, histograms, and box plots). Connections: *SCHS-S1C1-04*; *SCHS-S1C2-03*; *SCHS-S1C2-05*; *SCHS-S1C4-02*; *SCHS-S2C1-04*; *ETHS-S6C2-03*; *SSHS-S1C1-04*; *9-10.RST.7*	A I ★	*HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.			
HS.S-ID.A.2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. Connections: *SCHS-S1C3-06*; *ETHS-S6C2-03*; *SSHS-*	A I ★	*HS.MP.2*. Reason abstractly and quantitatively. *HS.MP.3*. Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. HS.MP.5. Use appropriate tools			

Statistics and Probability: Interpreting Categorical and Quantitative Data★ (S-ID) **Summarize, represent, and interpret data on a single count or measurement variable.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
S1C1-01		strategically. *HS.MP.7.* Look for and make use of structure.			
HS.S-ID.A.3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). Connections: *SSHS-S1C1-01*; *ETHS-S6C2-03*; *9-10.WHST.1a*	A I ★	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4*. Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.7.* Look for and make use of structure.			
HS.S-ID.A.4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population	A II ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and			

Statistics and Probability: Interpreting Categorical and Quantitative Data★ (S-ID) **Summarize, represent, and interpret data on a single count or measurement variable.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. Connections: *ETHS-S1C2-01*; *ETHS-S6C2-03*; *11-12.RST.7*; *11-12.RST.8*; *11-12.WRT.1b*		quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			

Statistics and Probability: Interpreting Categorical and Quantitative Data ★ (S-ID) **Summarize, represent, and interpret data on two categorical and quantitative variables.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.S-ID.B.5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. Connections: *ETHS-S1C2-01*; *ETHS-S6C2-03*; *11-12.RST.9*; *11-12.WHST.1a-1b*; *11-12.WHST.1e*	A I ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.8.* Look for and express regularity in repeated reasoning.			
HS.S-ID.B.6. Represent data on two quantitative variables on a scatter plot, and describe how the	A I A II ★	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable			

Statistics and Probability: Interpreting Categorical and Quantitative Data ★ (S-ID) **Summarize, represent, and interpret data on two categorical and quantitative variables.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
variables are related. Connections: *SCHS-S1C2-05*; *SCHS-S1C3-01*; *ETHS-S1C2-01*; *ETHS-S1C3-01*; *ETHS-S6C2-03*		arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			
a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or chooses a function suggested by the context. Emphasize linear, quadratic, and exponential models.* Connection: *11-12.RST.7*	A I A II ★				
b. Informally assess the fit of a function by plotting and	A I ★				

Statistics and Probability: Interpreting Categorical and Quantitative Data ★ (S-ID)

Summarize, represent, and interpret data on two categorical and quantitative variables.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
analyzing residuals. Connections: *11-12.RST.7*; *11-12.WHST.1b-1c*					
c. Fit a linear function for a scatter plot that suggests a linear association. Connection: *11-12.RST.7*	A I ★				

Statistics and Probability: Interpreting Categorical and Quantitative Data ★(S-ID)

Interpret linear models.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.S-ID.C.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. Connections: *SCHS-S5C2-01*; *ETHS-S1C2-01*;	A I ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with	1.4 1.56	To analyze ate of change using Pascal's Law (F = P ● A) To determine tire size (circumference vs. diameter) and calculate final drive ratios rev	Sam conducted an experiment to determine the resistance of an unknown resistor. By using a variable voltage power supply, he was able to measure the different amperages. He was then able to compute the rate of change. Amps: 0.06, 0.12, 0.24 Volts: 3, 6, 12 Find an equation for Sam's experiment and describe what the slope (rate of change) and the intercept (constant term) mean.

Statistics and Probability: Interpreting Categorical and Quantitative Data ★(S-ID) **Interpret linear models.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
ETHS-S6C2-03; *9-10.RST.4*; *9-10.RST.7*; *9-10.WHST.2f*		mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision.	2.4	per min to mph To identify rate of change of Ohm's Law To determine resistance versus temperature of water	**Solution:** y = 0.50 x; the slope is the number of ohms, and the intercept means at 0 amps there are 0 volts.
HS.S-ID.C.8. Compute (using technology) and interpret the correlation coefficient of a linear fit. Connections: *ETHS-S1C2-01*; *ETHS-S6C2-03*; *11-12.RST.5*; *11-12.WHST.2e*	A I ★	*HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.8.* Look for and express regularity in repeated reasoning.			
HS.S-ID.C.9. Distinguish between correlation and causation. Connection: *9-10.RST.9*	A I ★	*HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics.	2.4	To show causation using Ohm's Law	An auto student states, "In a circuit with 5 volts, as you raise the resistance the amperage goes down." Is this conclusion justified? If yes, how could one prove it? **Solution:** Using Ohm's law, if one had a 5 volt circuit with 2 Ohms resistance one would have a 2.5 amp current flow. If one raised the resistance to 5 Ohms, he would have a current flow of 1 amp, which is lower.

Statistics and Probability: Interpreting Categorical and Quantitative Data ★ (S-ID) **Interpret linear models.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
		HS.MP.6. Attend to precision.			

Statistics and Probability: Making Inferences and Justifying Conclusions ★ (S-IC) **Understand and evaluate random processes underlying statistical experiments.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.S-IC.A.1. Understand statistics as a process for making inferences to be made about population parameters based on a random sample from that population.	A II ★	*HS.MP.4.* Model with mathematics. *HS.MP.6.* Attend to precision.			
HS.S-IC.A.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin will fall heads up with probability 0.5. Would a result of 5*	A II ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3*. Construct viable arguments and critique the			

Statistics and Probability: Making Inferences and Justifying Conclusions ⋆ (S-IC) **Understand and evaluate random processes underlying statistical experiments.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
tails in a row cause you to question the model? Connections: *ETHS-S6C2-03*; *9-10.WHST.2d*; *9-10.WHST.2f*		reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			

Statistics and Probability: Making Inferences and Justifying Conclusions ⋆ (S-IC) **Make inferences and justify conclusions from sample surveys, experiments, and observational studies.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.S-IC.B.3. Recognize the purposes of and	A II ★	*HS.MP.3.* Construct viable arguments and			

Statistics and Probability: Making Inferences and Justifying Conclusions ★ (S-IC) **Make inferences and justify conclusions from sample surveys, experiments, and observational studies.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. Connections: *11-12.RST.9*; *11-12.WHST.2b*		critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.6.* Attend to precision.			
HS.S-IC.B.4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. Connections: *ETHS-S6C2-03*; *11-12.RST.9*; *11-12.WHST.1e*	A II ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.			
HS.S-IC.B.5. Use data from a randomized experiment to compare two treatments; use	A II ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.4.* Model with			

Statistics and Probability: Making Inferences and Justifying Conclusions ★ (S-IC) **Make inferences and justify conclusions from sample surveys, experiments, and observational studies.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
simulations to decide if differences between parameters are significant. Connections:*ETHS-S6C2-03*; *11-12.RST.4*; *11-12.RST.5*; *11-12.WHST.1e*		mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.8.* Look for and express regularity in repeated reasoning.			
HS.S-IC.B.6. Evaluate reports based on data. Connections: *11-12.RST.*4; *11-12.RST.5*; *11-12.WHST.1b*; *11-12.WHST.1e*	A II ★	*HS.MP.1*. Make sense of problems and persevere in solving them. HS.MP.2. Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.			

Statistics and Probability: Making Inferences and Justifying Conclusions ★ (S-IC) **Make inferences and justify conclusions from sample surveys, experiments, and observational studies.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
		HS.MP.6. Attend to precision. *HS.MP.7*. Look for and make use of structure. *HS.MP.8*. Look for and express regularity in repeated reasoning.			

Statistics and Probability: Conditional Probability and the Rules of Probability ★ (S-CP) **Understand independence and conditional probability and use them to interpret data.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.S-CP.A.1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or,"	A II ★	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure.			

Statistics and Probability: Conditional Probability and the Rules of Probability ★ (S-CP) **Understand independence and conditional probability and use them to interpret data.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
"and," "not"). Connection: *11-12.WHST.2e*					
HS.S-CP.A.2. Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent. Connection: *11-12.WHST.1e*	A II ★	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure.			
HS.S-CP.A.3. Understand the conditional probability of *A* given *B* as *P*(*A* and *B*)/*P*(*B*), and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A*, and the	A II ★	*HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure.			

Statistics and Probability: Conditional Probability and the Rules of Probability ★ (S-CP) **Understand independence and conditional probability and use them to interpret data.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
conditional probability of *B* given *A* is the same as the probability of *B*. Connections: *11-12.RST.5*; *11-12.WHST.1e*					
HS.S-CP.A.4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English.*	A II ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend			

Statistics and Probability: Conditional Probability and the Rules of Probability ★ (S-CP) **Understand independence and conditional probability and use them to interpret data.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results. Connections: *ETHS-S6C2-03*; *11-12.RST.4*; *11-12.RST.9*; *11-12.WHST.1e*		to precision. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			
HS.S-CP.A.5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have*	A II ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.4.* Model with mathematics. *HS.MP.6.* Attend to precision. *HS.MP.8.* Look for and express regularity in repeated			

Statistics and Probability: Conditional Probability and the Rules of Probability ★ (S-CP) **Understand independence and conditional probability and use them to interpret data.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
lung cancer. Connections: *11-12.RST.4*; *11-12.RST.5*;*11-12.WHST.1e*		reasoning.			

Statistics and Probability: Conditional Probability and the Rules of Probability ★ (S-CP) **Use the rules of probability to compute probabilities of compound events in a uniform probability model.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.S-CP.B.6. Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A*, and interpret the answer in terms of the model. Connections: *ETHS-S1C2-01*; *ETHS-S6C2-03*; *11-12.RST.9*; *11-12.WHST.1b*; *11-12.WHST.1e*	A II ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.7.* Look for and make use of structure.			
HS.S-CP.B.7. Apply the Addition Rule, *P*(*A* or *B*) = *P*(*A*) + *P*(*B*) – *P*(*A* and *B*), and interpret the answer in terms of the model. Connections: *ETHS-S1C2-01*; *ETHS-S6C2-03*; *11-12.RST.9*	A II ★	*HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure.			
HS.S-CP.B.8. Apply the general Multiplication Rule	+ ★	*HS.MP.4.* Model with			

Statistics and Probability: Conditional Probability and the Rules of Probability ★(S-CP) **Use the rules of probability to compute probabilities of compound events in a uniform probability model.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
in a uniform probability model, $P(A \text{ and } B) = P(A)P(B\|A) = P(B)P(A\|B)$, and interpret the answer in terms of the model. Connections: *ETHS-S1C2-01*; *ETHS-S6C2-03*; *11-12.RST.9*		mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure.			
HS.S-CP.B.9. Use permutations and combinations to compute probabilities of compound events and solve problems. Connections: *ETHS-S1C2-01*; *ETHS-S6C2-03*; *11-12.RST.9*	+ ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.4.* Model with mathematics. *HS.MP.5*. Use appropriate tools strategically. *HS.MP.7.* Look for and make use of structure.			

Statistics and Probability: Using Probability to Make Decisions ★ (S-MD)

Calculate expected values and use them to solve problems.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.S-MD.A.1. Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions. Connections: *ETHS-S6C2-03*; *11-12.RST.5*; *11-12.RST.9*; *11-12.WHST.1b*; *11-12.WHST.1e*	+ ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			

Statistics and Probability: Using Probability to Make Decisions ⋆ (S-MD) **Calculate expected values and use them to solve problems.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.S-MD.A.2. Calculate the expected value of a random variable; interpret it as the mean of the probability distribution. Connections: *ETHS-S1C2-01*; *ETHS-S6C2-03*; *11-12.RST.3*; *11-12.RST.4*; *11-12.RST.9*	+ ★	*HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure.			
HS.S-MD.A.3. Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. *For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five*	+ ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.			

Statistics and Probability: Using Probability to Make Decisions ★ (S-MD) **Calculate expected values and use them to solve problems.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes. Connections: *ETHS-S1C2-01*; *ETHS-S6C2-03*; *11-12.RST.3*; *11-12.RST.9*; *11-12.WHST.1b*; *11-12.WHST.1e*		*HS.MP.7.* Look for and make use of structure.			
HS.S-MD.A.4. Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. *For example, find a current data distribution on the number of TV sets per household in the United States, and*	+ ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools			

Statistics and Probability: Using Probability to Make Decisions ⋆ (S-MD) **Calculate expected values and use them to solve problems.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households? Connections: *ETHS-S1C2-01*; *ETHS-S6C2-03*; *11-12.RST.9*; *11-12.WHST.1b*; *11-12.WHST.1e*		strategically. *HS.MP.7.* Look for and make use of structure.			

Statistics and Probability: Using Probability to Make Decisions ⋆ (S-MD) **Use probability to evaluate outcomes of decisions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
HS.S-MD.B.5. Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. Connections: *SSHS-*	+ ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.*	1.1* 2.1 3.1 4.1 5.1 6.1 7.1 8.1	To understand probabilities associated with failures.	The owner of a repair shop received a service bulletin saying that the probability of part A failing is $\frac{1}{100}$. The probability of part B failing is $\frac{1}{50}$, and the probability of part C failing is $\frac{1}{25}$. What is the probability of any of these parts failing? **Solution:**

Statistics and Probability: Using Probability to Make Decisions ★ (S-MD) **Use probability to evaluate outcomes of decisions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
S5C2-03; *SSHS-S5C5-03*; *SSHS-S5C5-05*; *ETHS-S1C2-01; ETHS-S6C2-03*		Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			Probability of any of those happening is the sum of the probabilities. $\frac{1}{100}+\frac{1}{50}+\frac{1}{25}=\frac{7}{100}$
a. Find the expected payoff for a game of chance. *For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.* Connections: 11-12.RST.3; *11-12.RST.9*; *11-12.WHST.1b*; *11-12.WHST.1e*	+ ★				
b. Evaluate and compare strategies on the basis of expected values. *For example, compare a high-deductible versus a low-deductible automobile insurance policy*	+ ★				

Statistics and Probability: Using Probability to Make Decisions ⋆ (S-MD) **Use probability to evaluate outcomes of decisions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
using various, but reasonable, chances of having a minor or a major accident. Connections: *11-12.RST.3*; *11-12.RST.9*; *11-12.WHST.1b*; *11-12.WHST.1e*					
HS.S-MD.B.6. Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). Connections: *ETHS-S1C2-01*; *ETHS-S6C2-03*; *11-12.RST.3*; *11-12.RST.9*; *11-12.WHST.1b*; *11-12.WHST.1e*	+ ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically.			

Statistics and Probability: Using Probability to Make Decisions ★ (S-MD) **Use probability to evaluate outcomes of decisions.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
		HS.MP.7. Look for and make use of structure.			
HS.S-MD.B.7. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game). Connections: *ETHS-S1C2-01*; *ETHS-S6C2-03*	+ ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4*. Model with mathematics. *HS.MP.5*. Use appropriate tools strategically. *HS.MP.7.* Look for and make use of structure.			

Contemporary Mathematics: Discrete Mathematics ★ (CM-DM)

Understand and apply vertex-edge graph topics.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
AZ.HS.CM-DM.A.1. Study the following topics related to vertex-edge graphs: Euler circuits, Hamilton circuits, the Travelling Salesperson Problem (TSP), minimum weight spanning trees, shortest paths, vertex coloring, and adjacency matrices. Connections: *ETHS-S6C2-03*; *11-12.RST.4*; *11-12.RST.5*; *11-12.RST.9*; *11-12.WHST.1b*; *11-12.WHST.1e*	+ ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated reasoning.			

Contemporary Mathematics: Discrete Mathematics ★ (CM-DM)

Understand and apply vertex-edge graph topics.

Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
AZ.HS.CM-DM.A.2. Understand, analyze, and apply vertex-edge graphs to model and solve problems related to paths, circuits, networks, and relationships among a finite number of elements, in real-world and abstract settings. Connections: *ETHS-S6C2-03*; *11-12.RST.9*; *11-12.WHST.1b*; *11-12.WHST.1e*;	+ ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2*. Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in repeated			

Contemporary Mathematics: Discrete Mathematics ★ (CM-DM) **Understand and apply vertex-edge graph topics.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
		reasoning.			
AZ.HS.CM-DM.A.3. Devise, analyze, and apply algorithms for solving vertex-edge graph problems. Connections: *ETHS-S6C2-03*; *11-12.RST.3*; *11-12.RST.4*; *11-12.RST.9*; *11-12.WHST.1a*; *11-12.WHST.1b*; *11-12.WHST.1e*	+ ★	*HS.MP.1.* Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7.* Look for and make use of structure. *HS.MP.8.* Look for and express regularity in			

Contemporary Mathematics: Discrete Mathematics ★ (CM-DM) **Understand and apply vertex-edge graph topics.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
		repeated reasoning			
AZ.HS.CM-DM.A.4. Extend work with adjacency matrices for graphs, such as interpreting row sums and using the nth power of the adjacency matrix to count paths of length *n* in a graph. Connections: *ETHS-S6C2-03*; *11-12.RST.4*; *11-12.RST.5*; *11-12.RST.9*; *11-12.WHST.1a*; *11-12.WHST.1b*; *11-12.WHST.1e*	+ ★	*HS.MP.1*. Make sense of problems and persevere in solving them. *HS.MP.2.* Reason abstractly and quantitatively. *HS.MP.3.* Construct viable arguments and critique the reasoning of others. *HS.MP.4.* Model with mathematics. *HS.MP.5.* Use appropriate tools strategically. *HS.MP.6.* Attend to precision. *HS.MP.7*. Look for and make use of structure. *HS.MP.8.* Look for and express			

Contemporary Mathematics: Discrete Mathematics ★ (CM-DM) **Understand and apply vertex-edge graph topics.**					
Standards *Students are expected to:*	***TRAD***	***Mathematical Practices***	***CTE Standard / Measurement Criterion***	***Application of Mathematics Standard***	***Explanations and Examples***
		regularity in repeated reasoning.			